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Whence $dX=k^2[(y^2-x^2)dx-2xydy]\div(x^2+y^2)^2$ and $dY=k^2[(x^2-y^2)dy-2xydx]\div(x^2+y^2)^2$.

$$\text{Hence }\frac{dX}{dY}=\frac{(x^2-y^2)dy-2xydx}{(y^2-x^2)dx-2xydy}.$$

Hence, if x' and y' be the co-ordinates of a point on the curve, the tangent at its inverse point may be

$$\text{written }\left(y-\frac{k^2y'}{x'^2+y'^2}\right)=\frac{(x'^2-y'^2)dy'-2x'y'dx'}{(y'^2-x'^2)dx'-2x'y'dy'}\left(x-\frac{k^2x'}{x'^2+y'^2}\right).$$

Also solved by *G. B. M. ZERR.*

PROBLEMS.

30. Proposed by E. W. NICHOLS, Professor of Mathematics in the Virginia Military Institute, Lexington, Virginia.

Given the cardioid $r=a\ (1-\cos\theta)$; find the area of its circumscribing square formed by tangents making angles of 45° with its axis.

31. Proposed by E. B. ESCOTT, Ann Arbor, Michigan.

Through a point O on the produced diameter AB of a simicircle draw a secant ORR', so that the quadrilateral $ABRR'$ inscribed in the semicircle shall be a maximum. Prove that in this case, the projection of RR' on AB is equal in length to the radius of the circle. [*Williamson's Diff. Calculus, 7th edition, p. 189, Ex, 25.*]

MECHANICS.

Conducted by B. F. FINKEL, Kidder, Mo. All contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

12. Proposed by Professor J. F. W. SCHEFFER, A. M., Hagerstown, Maryland.

A horizontal table without weight is supported on three points A, B, and C. A weight W is laid upon the table, at a point G. If $AG=a$, $BG=b$, $CG=c$, $\angle AGB=\beta$, and $\angle AGC=\nu$, find the pressures upon A, B, and C.

I. Solution by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland, and L. B. FRAKER, Weston, Ohio.

From the problem, we have $AB=\sqrt{(a^2+b^2-2ab\cos\beta)},=m$. Simi-